

**eco**  
**apples**<sup>TM</sup>  
BORN AND RAISED HERE<sup>TM</sup>

**Eco Apple Protocol and Grower Self-Assessment**

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***For 2008 Growing Season – Version 4.2 – 03/28/08***

***See page 27 for list of revisions to this edition.***

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## **THE ECO APPLE PROJECT**

In partnership with farmers, scientists and other agricultural professionals, Red Tomato has developed this protocol to achieve measurable reductions in the use of high toxicity pesticides. Through our work, we hope to contribute to a bountiful supply of quality, local foods with minimal pesticide residues, and to improve our soil and water resources, wildlife biodiversity, farm worker safety, farm stability and farmland preservation in the Northeastern USA.

Our protocol is based on a reduced-risk program developed by researchers, consultants and growers, and generally follows guidelines for Integrated Production by the International Organization for Biological and Integrated Control and Noxious Animals and Plants (IOBC).

Practices contained in this protocol are considerably more expensive than conventional programs that rely on highly toxic pesticides. Our project works to incorporate economic incentives for farmers to adopt reduced-risk methods. We recognize that reducing toxicity is an ongoing process. Our goal is to improve continuously as we learn more about reduced-risk alternatives and what it takes to implement them *and* grow high quality apples.

Red Tomato is a nonprofit organization that helps family farmers survive and thrive by connecting them to customers who want high-quality produce, by developing new markets and managing all the logistics and promotion needed to ensure success in a supermarket environment, and educating trade buyers and consumers to appreciate and seek out products that are ecologically grown by family farmers.

### **Roles and Procedures**

Red Tomato is the lead organization. Decisions on the protocol, procedures and market approach will be made in concert with researchers, crop consultants, growers and others. The IPM Institute of North America, an independent non-profit organization, will maintain the protocol with advice from the project partners. The Institute will also coordinate inspection by independent, third-party IPM professionals, review materials submitted by growers and inspectors, and make final determination on certification approvals. To apply for and maintain certification, the following steps will be followed:

1. All growers complete this Self-Assessment and submit to the IPM Institute with required pesticide application records and fees by August 1. For first year growers, the Institute will appoint an inspector to verify the information provided during an on-site audit to be scheduled prior to marketing certified fruit and every third year thereafter. All minimum requirements must be in place (Section I), and the required minimum score must be earned on optional practices (Section II).
2. Each year thereafter, participating growers will update and submit this Self-Assessment along with the certification fee and scouting and pesticide, fertilizer, thinner and growth regulator application records to the Institute by August 1. If these are not received by August 1, the Institute will appoint an inspector to conduct a site visit for additional cost.
3. Application records must include at least the date of application, block(s), acreage, trade name and formulation of material applied (with EPA registration number and target pest for pesticides) and rate per acre (oz., gals. or lbs./acre). Cost per unit (lb., gallon) for each pesticide used must also be included.

Scouting records must include date, block(s), pest and result, e.g., captures per trap, mites per leaf, etc.

4. Annually, Red Tomato and its partners will review and evaluate the project and make adjustments as needed to continue to achieve our goals. The IPM Institute will update the protocol and certification procedures as needed. This review will be very important to address changes in product availability and pests, and improve our performance.

### ECO-APPLE SELF-EVALUATION COVER SHEET

Grower Name: \_\_\_\_\_  
\_\_\_\_\_

Business Name: \_\_\_\_\_  
\_\_\_\_\_

Physical address: \_\_\_\_\_  
\_\_\_\_\_

Phone: ( ) \_\_\_\_\_ Fax: ( ) \_\_\_\_\_  
\_\_\_\_\_

Cell Phone: ( ) \_\_\_\_\_

Email address: \_\_\_\_\_  
\_\_\_\_\_

Website: \_\_\_\_\_  
\_\_\_\_\_

**Orchard Block List.** List orchard blocks covered by this self-assessment below. Blocks with the same management practices (that will earn same scores throughout this assessment) can be grouped together as one block. Attach additional pages if needed to list all blocks. **Important:** If differences in the way individual blocks are managed impacts a response on this self-assessment, they should be listed as separate blocks. For example, if apple maggot is controlled by trapping in only one block, list and score that block as a separate block.

1. Block name(s): \_\_\_\_\_  
\_\_\_\_\_

cultivar(s): \_\_\_\_\_  
\_\_\_\_\_

acres and estimated annual production (bu.): \_\_\_\_\_  
\_\_\_\_\_

2. Block name(s): \_\_\_\_\_  
\_\_\_\_\_

cultivar(s): \_\_\_\_\_  
\_\_\_\_\_

acres and estimated annual production (bu.): \_\_\_\_\_  
\_\_\_\_\_

3. Block name(s): \_\_\_\_\_  
\_\_\_\_\_

cultivar(s): \_\_\_\_\_  
\_\_\_\_\_

acres and estimated annual production (bu.): \_\_\_\_\_  
\_\_\_\_\_

4. Block name (s): \_\_\_\_\_  
\_\_\_\_\_

cultivars: \_\_\_\_\_  
\_\_\_\_\_

acres and estimated annual production (bu.): \_\_\_\_\_  
\_\_\_\_\_

5. Block name (s): \_\_\_\_\_  
\_\_\_\_\_

cultivars: \_\_\_\_\_  
\_\_\_\_\_

acres and estimated annual production (bu.): \_\_\_\_\_  
\_\_\_\_\_

**I. Minimum Requirements – Enter Pass (P), Fail (F) or Not Applicable (NA) in the column provided for each block or group of blocks listed on the preceding page.**

Grower must implement all of the following. Items rated as F must be addressed before certification is approved. Explain any F or NA scores. Attach additional pages as needed.

**Provision for Emergencies:** If an emergency situation arises during the growing season where you feel that a pest problem cannot be managed without violating the protocol, contact the IPM Institute immediately. An expert panel of project scientists will assess the problem and options, and determine if an exception to the protocol is justified.

<i>Enter P, F or NA for each block in the columns to the right</i>	<i>Block Number</i>				
<b>1. Grower meets legal requirements</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
a. Pesticides used are legally available for the use and application rate.					
b. Applicators hold required licenses and certification.					
c. Pesticide storage meets legal requirements.					
d. Used pesticide container disposal and recycling meets legal requirements.					
e. Required pre-harvest intervals are observed.					
f. Worker housing meets legal requirements.					
g. Pesticide application records meet legal requirements.					
<b><i>Worker Protection Standard-related legal requirements:</i></b>					
h. Central posting includes safety poster, emergency contacts, pesticide information.					
i. Pesticide safety training is provided for workers.					
j. Decontamination equipment and supplies are available.					
k. Personal protective equipment is available to all workers and used according to requirements on pesticide label.					
l. Application notification and postings are made, including posting and observation of required re-entry times.					

Notes – Explain any F or N/A scores:

<i>Enter P, F or NA for each block in the columns to the right</i>	<i>Block Number</i>				
<b>2. Soil and Water Conservation</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
a. Soil and foliar analysis are conducted at least every three years to determine available nutrients.					
b. Results from soil and/or foliar analysis are used to calculate nutrient application rates, to minimize nutrient use and limit potential for nutrient pollution.					
c. Nitrogen applications are made only between bud break and July 1 with the exception of post-harvest urea applications made to leaf litter between leaf fall and bud break for scab management.					
d. If total actual nitrogen application rate exceeds 50 lbs./acre, two applications of less than 50 lbs. each are made at least one week apart to minimize runoff risk.					
e. Soil pH is tested at least every three years and maintained between 6 and 7.					
f. The most recent soil/foilage test results are available for inspection.					
g. Nutrient application records for the past 12 months are available for inspection.					
h. Row middles (drive rows) are sod or mulch-covered year round.					
i. Visibly eroded areas are not present and immediately corrected if they occur.					
j. A vegetated buffer separates surface water from managed apple trees by at least 50 ft., or larger where required by the pesticide labels for materials applied.					

Notes – Explain any F or N/A scores:

<i>Enter P, F or NA for each block in the columns to the right</i>	<i>Block Number</i>				
<b>3. Pesticide Use and Hazard Reduction</b>					
<b>3A. General practices</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
a. Trees are well pruned to allow penetration of light, air and spray material.					
b. Prunings are destroyed or removed such that no residue remains after one year.					
c. Summer pruning is used on vigorously growing trees.					
d. Tree row volume is used to configure spray pattern and calculate rates. (Any mandatory minimum applications rates specified on the product label must be met.)					
e. Pesticide application equipment is calibrated at least annually.					
f. Records from the most recent calibration are available for inspection.					
g. Pesticides no longer used (e.g., no longer registered for use) are returned to dealer or disposed of at the next collection. While in storage, obsolete pesticides are clearly marked and separated from pesticides in current use.					
h. Grower has access to current wind speeds (e.g., hand-held monitor, weather station, Skybit) and uses this information to reduce potential for drift. Label requirements referencing maximum wind speeds are followed.					
i. Prohibited pesticides (see Section III. Do Not Use list) are not used.					
j. Scouting records for the current and previous season are available for inspection.					

Notes – Explain any F or N/A scores:

<i>Enter P, F or NA for each block in the columns to the right</i>	<i>Block Number</i>				
<b>3B. Pest-Specific Practices</b>					
<p>Note: <b>Systematic sampling</b> or monitoring requires following a standard and ideally written procedure, e.g., sampling a pre-determined number of leaves and trees in each block for mites, and where available, using a quantitative threshold to determine need to treat. The procedure should be one recommended by Extension where available and may be reasonably modified by grower and/or crop advisor experience. Modifications may include adjustments for weather conditions, or practicality of implementing the procedure and responding to results in the given orchard or block. Explain variance from Extension recommendations or protocol specifications in notes.</p>					
<b>Apple scab</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
a. Fungicides for scab cease within two weeks after primary scab season (as per Extension communications) unless visible infections are found during scouting.					
<b>Mites</b>					
a. Post-bloom miticides are applied only after both mites and mite predators have been systematically sampled in each block and predators are insufficient to provide control. Systematic sampling includes viewing a pre-determined number of leaves and trees in each block for and using a quantitative threshold for determining need to treat such as those found in the New England Tree Fruit Management Guide, the Cornell Pest Management Guidelines for Commercial Tree Fruit Production, Pennsylvania Tree Fruit Production Guide.					
b. No more than two post-bloom applications of miticide are made per season.					
<b>Tarnished plant bug</b>					
a. Orchard blocks are not treated for tarnished plant bug unless captures on white sticky traps are over threshold in each block treated. Place traps no later than silver tip and use one trap per three to five acres and at least five traps per block. Suggested thresholds include a cumulative average by tight cluster of three per trap (for apples destined for the wholesale market) or five per trap (for retail markets where dimpled fruit are less of a concern); and five per trap (wholesale) or eight per trap (retail) at late pink. <b>Note:</b> Research results to date suggest cost of control is not justified because feeding damage does not substantially affect fruit grade and/or current control options are not very effective. Growers are requested to consider leaving some trees untreated in blocks over threshold to assess extent of economic damage.					
<b>Fire Blight</b>					
a. Streptomycin is only applied for fire blight according to a weather-based forecasting program such as Maryblyt or Cougarblight.					
b. Post-bloom applications of streptomycin for fire blight are made only in the event of hail or high wind damage in orchards with existing infections.					

<i>Enter P, F or NA for each block in the columns to the right</i>	<b>Block Number</b>				
<b>3B. Pest-Specific Practices (continued)</b>					
<b>Plum curculio</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
a. After the first application of pesticide for plum curculio at petal fall, further treatment decisions are based on sampling fruit for any sign <b>of</b> fresh injury, fruit diameter reaching 6-7 mm and/or a degree-day-based oviposition model.					
b. Second (and third if necessary) pesticide applications for plum curculio are perimeter row sprays rather than whole block treatments. <i>You may score as NA for blocks with trees less than 7 ft. in height, or where scouting indicates fresh injury in the interior of a block (i.e., where full block applications may be needed).</i>					
<b>Codling Moth</b>					
a. Codling moth is not treated unless need is indicated by block or region history of economic injury or by monitoring using pheromone traps or sampling for damage. NOTE: No pheromone trap capture threshold has been definitively established for the region. Captures and thresholds vary depending on trap density, lure type and whether or not mating disruption is in use. Four to five codling moths/trap/week is used in some other regions. <i>Score as NA if no block or region history of economic injury due to codling moth.</i>					
b. If codling moth is treated, degree-days are used to calculate treatment timing with the first treatment applied at 250 degree days (base 50) after the first sustained pheromone trap catch (biofix) of each generation. If pressure is severe as indicated by pheromone traps or fruit damage, additional applications may be made 10-14 days after these applications. <i>Score as NA if no treatments are made for codling moth.</i>					
<b>Obliquebanded Leafroller</b>					
a. Obliquebanded leafroller is not treated unless need is indicated by systematic sampling for infested clusters or terminals (e.g., 3% infested using the sampling procedure described in the Cornell Guide for Pest Management of Tree Fruit). <i>Score as NA if there is no block or region history of economic injury due to obliquebanded leafroller.</i>					
b. If obliquebanded leafroller is treated, no more than one application is used against the overwintering generation (bloom or petal fall). Two applications may be used against second generation. Use degree days to calculate treatment timing with the first treatment applied at 360 degree days (base 43F) after the first pheromone trap catch (biofix) and a second applied 10-14 days later. <i>Score as NA if no treatments are made for obliquebanded leafroller.</i>					

Notes – Explain any F or N/A scores:

<i>Enter P, F or NA for each block in the columns to the right</i>	<i>Block Number</i>				
<b>Summer diseases: Sooty blotch, fly speck</b>					
a. Fungicides are not applied for summer disease until 270 accumulated wetting hours from petal fall (any early infections will be controlled by scab fungicides). If wetting data are not available, early-July may be used as an estimated date. Thereafter, fungicides should be applied at intervals no closer than those listed in Table A.					
Table A. Activity of fungicides against summer diseases					
<p>Fungicide Rate per 100 gal. Minimum interval (days) Maximum rainfall (in.) during interval</p> <p>Topsin M <i>plus</i> Captan 50W 3 oz 1.0 lb</p> <p>21</p> <p>2.5</p> <p>Captan 50W 1 lb. 14 2.0</p> <p>Flint 50 WDG 0.67 oz. 21 2.5</p> <p>Adapted from D.A. Rosenberger, Cornell University</p>					
<b>Apple maggot</b>					
a. Treatment decisions for apple maggot are based on monitoring with three or more sticky traps placed in each block and a threshold of $\geq 1$ per trap if using unbaited traps, or $\geq 5$ per trap if using odor-baited traps. After treatment, wait 10 days, remove all captures from traps, and then begin counting captures towards the threshold.					
<b>Post-harvest diseases and disorders</b>					
a. Post-harvest fungicides are used only if fruit are dipped prior to storage, e.g., DPA is used.					
b. DPA is used only on susceptible varieties destined for CA storage.					
<b>Rodents/voles</b>					
a. If grain-based rodenticides (corn, oats) are used, they are applied in bait stations or burrows only.					

Notes – Explain any F or N/A scores:

<b>4. Grower Education and Self-Improvement</b>	<b>P/F</b>
a. Grower has attended educational meetings within the last year. List at least one:	
b. Grower plans the following improvement(s) over the next three years. List at least one:	

Notes – Explain any F or N/A scores:

<i>Enter P, F or NA for each block in the columns to the right</i>	<i>Block Number</i>				
<b>5. Food Safety and Product Quality</b>					
a. Clean toilet and hand-washing facilities are available to field, harvest and packing house staff.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
b. Livestock are not allowed in bearing orchards.					
c. Manure is not applied to bearing orchards.					
d. Only fruit of sound internal quality are sold as Eco-Apple label.					
e. Travel ways between trees and packinghouse/storage are smoothed prior to harvest.					
f. Fruit is harvested at correct maturity according to starch iodine, firmness or other accepted measures.					
g. Fruit bins and boxes are sound and clean of soil, plant or animal debris prior to use.					
h. Fruit that has fallen to the ground (drops) are not sold as Eco-Apples.					
i. Filled harvest containers are transported immediately to packing and storage.					

Notes – Explain any F or NA scores:

**II. Scored advanced practices. Enter points indicated under the appropriate block number if practice is implemented in that block or group of blocks. A minimum score of 20 points is required on this section for each block. Make note of any advanced practices implemented that are not listed here.**

	<i>Points available</i>	<i>Points earned</i>		
		<b>1</b>	<b>2</b>	<b>3</b>
<b>1. Soil and water conservation.</b>				
a. If irrigation is used, drip or trickle is installed to ensure adequate water supply and minimize water use and foliage wetness. <i>If no irrigation is used, award 1 point.</i>	<b>1</b>			
b. If irrigation is used, a rain-activated shutoff device, evapotranspiration or soil moisture monitoring are used to schedule irrigation timing/amounts. <i>If no irrigation is used, award 1 point.</i>	<b>1</b>			
c. On slopes with potential for erosion, tree rows are planted with contours.	<b>1</b>			
d. On roads with slopes with potential for erosion, water bars are installed.	<b>1</b>			
e. Tile drainage is installed and maintained in poorly drained soils, or trees are not planted in poorly drained soils.	<b>2</b>			
f. On sites at risk of wind-eroded soil, windbreaks are installed and maintained.	<b>1</b>			
g. A Conservation Plan for the farm has been developed according to NRCS standards; sensitive resource areas of the farm have been identified, and environmental risks (e.g., runoff containing nutrients or pesticide residues) have mitigations in planned or already in place (e.g., spray setbacks, field borders, buffer strips, etc).	<b>2</b>			
h. USDA NRCS WIN-PST software is used to evaluate the pesticides used in the orchard for impacts on water quality. See <a href="http://www.ipm.ucdavis.edu/TOX/watertox1.php">http://www.ipm.ucdavis.edu/TOX/watertox1.php</a> or contact NRCS.	<b>2</b>			
<b>Total Points Part 1:</b>	<b>1</b>			
	<b>1</b>			

Notes, additional practices used:

	<i>Points available</i>	<i>Points earned</i>		
<b>2. Pesticide Use and Hazard Reduction.</b>		<b>1</b>	<b>2</b>	<b>3</b>
a. Tractor cabs plus required PPE are used to protect applicators during applications.	<b>2</b>			
b. DANGER or WARNING labeled pesticides are not used.	<b>2</b>			
c. At least 25% of trees are disease resistant varieties and are not treated with fungicides for those diseases to which the varieties are resistant.	<b>2</b>			
d. At least 50% of trees are on M7 or smaller size-controlling rootstocks.	<b>1</b>			
e. Herbicides are not used in alleyways/drive rows.	<b>1</b>			
f. Herbicides are not used in tree rows; weeds are managed by non-chemical means.	<b>1</b>			
g. Alternate row mowing is done to preserve beneficials.	<b>2</b>			
h. Alternate row pesticide applications replace at least two full block applications.	<b>1</b>			
i. At least two insecticide applications are at reduced rates.	<b>1</b>			
j. No organophosphates are used as insecticides.	<b>2</b>			
k. No EBDC fungicides (e.g., Dithane, Manzate, Pencozeb, Polyram) are used.	<b>2</b>			
l. Post-harvest litter chopping or urea treatment are used to reduce scab pressure.	<b>2</b>			
m. Potential Ascospore Dose is assessed by systematic fall scouting; scab management is adjusted as per results.	<b>2</b>			
n. No miticides are used other than an early season oil spray. Mites are managed principally by conserving natural enemies.	<b>2</b>			
o. Mite thresholds are adjusted upwards based on varietal susceptibility, current or anticipated weather, or other factors reducing potential for economic injury.	<b>1</b>			
p. Apple maggot is controlled without pesticide sprays, e.g., by trap out.	<b>2</b>			
q. Grower experiments with sampling wild hosts of summer diseases adjacent to the orchard to assess inoculum pressure and adjusts fungicide programs as per results.	<b>2</b>			
r. All abandoned apple trees within 100 yards are removed to reduce immigration of codling moth and other pests.	<b>1</b>			
s. Wild hosts of tarnished plant bug are removed from the orchard and immediately adjacent areas to reduce tarnished plant bug populations.	<b>1</b>			
t. All red cedar and juniper trees within 100 yards are removed to reduce cedar rust inoculum in problem blocks.	<b>1</b>			
u. Rodents are managed without rodenticides, e.g., by mowing, mouse guards, removing drops, encouraging predators.	<b>1</b>			
v. Where codling moth requires intervention, mating disruption and/or bioinsectides containing granulosis virus are used.	<b>1</b>			
w. Where Oriental fruit moth requires intervention, mating disruption is used.	<b>1</b>			
<b>Total Points Part 2:</b>	<b>3</b>			
	<b>4</b>			

Notes, additional practices used:

	<i>Points available</i>	<i>Po ear</i>
<b>3. Grower education and self-improvement.</b>		
a. Grower has hosted a field day or other production-related educational meeting within last three years. List date, name/description of event:	<b>1</b>	
b. Grower has conducted on-farm research using control (e.g., untreated) trees for comparison within the last three years. List subject of research, dates:	<b>2</b>	
c. Grower belongs to state and/or regional grower organization. List organizations:	<b>2</b>	
<b>4. Energy conservation.</b>		
a. Energy-efficient lighting is used in office, packing and storage facilities.	<b>1</b>	
b. Alternatives (e.g., solar, wind) are used to meet at least 10% of electricity needs. List:	<b>1</b>	
c. Alternatives (e.g., biodiesel) are used to meet at least 10% of fuel needs. List:	<b>1</b>	
d. Storage energy use has been conserved by measures implemented in the last three years. List:	<b>1</b>	
<b>5. The following materials from office, field, packing house and storage are recycled.</b>		
a. Paper and cardboard	<b>0.25</b>	
b. Plastic	<b>0.25</b>	
c. Aluminum	<b>0.25</b>	
d. Glass	<b>0.25</b>	
e. Used pesticide containers where consistent with regulations	<b>0.25</b>	
f. Batteries	<b>0.25</b>	
g. Computers and other recyclable office equipment	<b>0.25</b>	
h. Engine oil	<b>0.25</b>	
<b>Total Points Part 3-5:</b>	<b>11</b>	

	<i>Points available</i>	<i>Points earned</i>
<b>6. Food Safety and Product Quality</b>		
a. Clean plastic bins are used to store fruit.	1	
b. Field bins, storage rooms and packinghouses are sanitized annually after storage and packing are completed.	1	
c. Packing facility has a written Standard Sanitary Operating Procedures plan.	1	
d. Packing line water flumes are chlorinated or otherwise treated to reduce potential for post-harvest diseases.	1	
e. Need to use DPA to reduce scald is determined at least in part by a temperature model, for example, accumulation of hours below 10° C prior to harvest.	1	
f. Cider production facility (if any) has a written HACCP plan.	1	
g. Farm is third-party certified for Good Agricultural Practices (e.g., by auditing firm, government agency and/or EurepGAP).	1	
h. Farm has a written Good Agricultural Practices plan.	1	
<b>Total Points Part 6:</b>	<b>7</b>	

Notes, additional practices used:

	<i>Points available</i>	<i>Points earned</i>		
		1	2	3
<b>SCORE CARD: Growers in the program more than one season must earn a total of at least 24 points for each block. First year growers must earn at least 20 points for each block.</b>				
<b>Total Points Part 1. Soil and water conservation.</b>	1 1			
<b>Total Points Part 2. Pesticide use and hazard reduction.</b>	3 4			
<b>Total Points Part 3-5. Grower education, resource conservation.</b>	1 1			
<b>Total Points Part 6. Food safety and product quality.</b>	8			
<b>Total Score (add columns, include total for Parts 3-6 in each column total)</b>	6 4			

### III. Beneficial Practices and Pesticide Hazard Ranking

The following practices and products are listed for Northeast apple production. Pesticide active ingredients have been evaluated for necessity to produce quality apples in the Northeast in commercial quantities, and for hazards to humans, natural enemies and other non-targets, potential to contaminate groundwater and resistance management. This is not an exhaustive list of practices or products. There are more than 1200 active pesticide registrations for apples!

Note: Brand names are for reference only. Additional brand names may also be available.

Pesticide hazards were analyzed using the database at [www.pesticideinfo.org](http://www.pesticideinfo.org), which collates which collates information from recognized authorities such as US EPA and individual State Lead Agencies (SLAs) for pesticide regulation. SLAs are housed in state departments of agriculture or state environmental management agency, depending on the state.

The following criteria were used to evaluate pesticides:

- Acute toxicity to wildlife, fish, aquatic invertebrates:** Product label
- Acute toxicity:** Caution, Warning or Danger Label/US EPA
- Neurotoxin:** Cholinesterase inhibitor or listed on Toxics Reduction Inventory maintained by US EPA
- Possible, likely, probable carcinogen:** US EPA, State of California, International Agency for Research on Cancer
- Reproductive/developmental toxin:** US EPA, State of California
- Toxic to pollinators, key natural enemies/secondary pests:** Product label, Extension recommendations, variety of published sources
- Toxic to wildlife:** Product label
- Suspected endocrine disruptor:** Illinois EPA, Keith, Colburn or Benbrook lists
- Broad spectrum pesticide:** Extension recommendations
- Resistance risk:** Extension recommendations
- Potential or known groundwater contaminant:** State of California, variety of published sources

The following process was used to determine use and use restrictions:

- a. Pesticide options currently in use by growers, or suggested by growers or others, are reviewed for status re the criteria listed above.
- b. There are more than 1000 pesticides labeled for use on apples. We only review those products currently in use or with strong potential for use, as suggested by participating growers and others.
- c. Pesticides that are useful for our pest issues that do not have hazards as per our criteria, or pesticides with relatively readily mitigated hazards, are placed in "Use with Justification" category. For example, for most products, aquatic toxicity is readily addressed by following label restrictions to avoid contamination of water bodies. **No pesticides may be used without justification, e.g., sampling and thresholds, or weather monitoring, or block history of a problem where sampling or monitoring methods and thresholds are not available.**

- d. Pesticides with hazards that are less readily mitigated are placed in the “Do Not Use” category. These are then reviewed for necessity in order to produce commercial quality fruit economically. Our goal is to limit the use of products with hazards to those we cannot do without.
- e. Products that needed to address a key pest are then moved to the “Use with Restrictions” category. Measures that we can take to mitigate hazards are included, e.g., limiting the number of applications, or limiting use to one pest issue where the product is critical for adequate control.
- f. Other products with similar hazards are not moved to the “Use with Restrictions” category just because the hazard profile is similar to those already in that category, but only if their use is a critical need that we identify as a group.
- g. This is a subjective process. Definitive data are not available on many of the considerations here, e.g., thresholds are lacking for many pests, efficacy is variable, development of resistance is a concern if available modes of action are limited. We don’t know for sure exactly where to draw the line. We try to reach consensus on issues but realize this will not be possible in all cases. The protocol belongs to Red Tomato, which delegates the final decision on contentious issues to the IPM Institute.

**IMPORTANT:** All of the following products may not be registered in every state. Please confirm that product is labeled for use in your state before using! Follow recommendations in your state’s apple production guide for all products and techniques used.

<b>NON-CHEMICAL PRACTICES – Partial list of practices with potential to reduce reliance on pesticides in North Carolina</b>	
<b>Practice</b>	<b>Description/Comments</b>
<b>Disease Management</b>	
litter chopping	flail mowing after leaves have fallen in late fall or before bud break in early spring to reduce apple scab
<b>Weed Management</b>	
cultivation, cover cropping	Special precautions must be taken to avoid root damage; fall-planted cover crops reduce erosion
flaming	Zeke Goodband has experience with Red Dragon equipment.
mowing	Planting slower growing varieties of ground cover can reduce mowing requirement.
mulching	Of bio-mulch options, woodchips may be best to minimize vole problems. Fabric/geotextile and lime are also options. Careful investigation and testing of these options is recommended.

<b>USE WITH JUSTIFICATION – Use only after systematic scouting or weather monitoring and science-based thresholds, or previous history where thresholds are not available, and only if registered for your intended use in your state. Follow all label directions. Resistance management strategies should be used, with particular emphasis on uses at which are noted below.</b>		
<b>Active ingredient</b>	<b>Trade name</b>	<b>Comments</b>
<b>Disease Management</b>		
<i>Bacillus subtilis</i>	Serenade	Not a ready substitute for other fungicides. See Quick Guide or Extension Bulletin for use against fire blight in rotation with streptomycin.
copper hydroxide	Kocide formulations with CAUTION label	toxic to fish and aquatic invertebrates, maximum of two applications per year (avoid earthworms)
copper oxychloride	COCS	toxic to fish and aquatic invertebrates, maximum of two applications per year (avoid earthworms)
cyprodinil	Vanguard	toxic to fish and aquatic invertebrates, potential ground water contamination
lime sulfur, Bordeaux mixture		Limit applications to reduce negative impacts on fruit size and number.

flumioxazin	Chateau	toxic to aquatic invertebrates
glyphosate, sulfosate	Roundup, Touchdown	limit applications and rotate with different mode of action to slow develop
<b>Insect/Mite Management</b>		
acequinocyl	Kanemite	toxic to aquatic invertebrates, make no more than two post-bloom miticid
acetamiprid	Assail	toxic to wildlife, toxic to bees, may result in spider mite flare up
apple maggot traps	baited, sticky or insecticide-coated spheres	baited, sticky or insecticide-coated spheres
<i>Bacillus thuringiensis</i>	Agree, Dipel, Deliver, MVP	
granulosis virus	Cyd-X	
indoxacarb	Avaunt	toxic to mammals, birds, fish, aquatic invertebrates
kaolin clay	Surround	
mating disruption	CheckMate, Disrupt, IsoMate sprayable pheromone formulations	
oil	Damoil, Sunspray, Omni, PureSpray	toxic to fish
pyriproxyfen	Esteem	
spinosad	Spintor, Success/Entrust	toxic to bees
<b>Other</b>		
prohexadione calcium	Apogee	
calcium chloride		
DPA	No Scald, Shield	Use CAUTION label formulations only
MCP		

**USE WITH RESTRICTIONS – Use with justification and only when less hazardous alternatives (e.g., those in table 1) are not available or otherwise inadequate. Follow all restrictions listed below and in accordance with all label directions and only if permitted by the state.**

Active ingredient	Trade name	Concerns	Use restrictions
<b>Disease Management</b>			
captan	Captan, Captec	acute toxicity (DANGER and WARNING label formulations), toxic to fish, carcinogen under prolonged exposure to high doses	1. Use lower rates for summer diseases.
copper hydroxide	Kocide, WARNING or DANGER label formulations	acute toxicity, toxic to fish and aquatic organisms	1. Use CAUTION label formulations where possible. 2. Maximum of two applications per season to limit damage to earthworms.
copper sulfate	Cuprofix, Disperss		
dodine	Cyprex, Syllit	acute toxicity (DANGER label), resistance	1. Do not use where resistance is suspected.
EBDCs:			
maneb, maneb plus zinc	Manex		See label
Use at the rate and in accordance with all label directions and only if permitted by the state.			
<b>Active ingredient</b>	<b>Trade name</b>	<b>Concerns</b>	<b>Use restrictions</b>
captan	Captan, Captec	acute toxicity (DANGER and WARNING label formulations), toxic to fish, carcinogen under prolonged exposure to high doses	1. Use lower rates for summer diseases.
copper hydroxide	Kocide, WARNING or DANGER label formulations	acute toxicity, toxic to fish and aquatic organisms	1. Use CAUTION label formulations where possible. 2. Maximum of two applications per season to limit damage to earthworms.
copper sulfate	Cuprofix, Disperss		
dodine	Cyprex, Syllit	acute toxicity (DANGER label), resistance	1. Do not use where resistance is suspected.
EBDCs:			
maneb, maneb plus zinc	Manex		See label
Use at the rate and in accordance with all label directions and only if permitted by the state.			
<b>Active ingredient</b>	<b>Trade name</b>	<b>Concerns</b>	<b>Use restrictions</b>
captan	Captan, Captec	acute toxicity (DANGER and WARNING label formulations), toxic to fish, carcinogen under prolonged exposure to high doses	1. Use lower rates for summer diseases.
copper hydroxide	Kocide, WARNING or DANGER label formulations	acute toxicity, toxic to fish and aquatic organisms	1. Use CAUTION label formulations where possible. 2. Maximum of two applications per season to limit damage to earthworms.
copper sulfate	Cuprofix, Disperss		
dodine	Cyprex, Syllit	acute toxicity (DANGER label), resistance	1. Do not use where resistance is suspected.
EBDCs:			
maneb, maneb plus zinc	Manex		See label
Use at the rate and in accordance with all label directions and only if permitted by the state.			
<b>Active ingredient</b>	<b>Trade name</b>	<b>Concerns</b>	<b>Use restrictions</b>
fludioxonil	Scholar	toxic to fish and aquatic invertebrates	possible carcinogen, toxic to fish and aquatic invertebrates
pyraclostrobin	Primo	developmental/reproductive toxicity, acute aquatic toxicity	steroid inhibitors: possible carcinogen, toxic to fish and aquatic invertebrates
triflumizole	Procurve	developmental/reproductive toxicity, acute aquatic toxicity	steroid inhibitors: possible carcinogen, toxic to fish and aquatic invertebrates
myclobutanil	Nova	developmental/reproductive toxicity, acute aquatic toxicity	steroid inhibitors: possible carcinogen, toxic to fish and aquatic invertebrates
streptomycin	Agri-mycin, Firewal		1. Apply only to soil

<b>DO NOT USE</b>		
<b>Active ingredient</b>	<b>Trade name</b>	<b>Concerns</b>
<b>Disease Management</b>		
kresoxim-methyl	Sovran	likely carcinogen, suspected groundwater contaminant
mefanoxam	Ridomil Gold	acute aquatic toxicity
pyrimethanil	Scala	possible carcinogen, suspected endocrine disruptor
thiabendazole	Mertect	likely carcinogen (high doses), developmental toxin
triadimefon	Bayleton	acute toxicity (DANGER, WARNING label formulations), possible carcinogen, reproductive/developmental toxin, suspected endocrine disruptor, resistance
ziram	Ziram	acute toxicity, likely carcinogen, developmental/reproductive toxin, suspected endocrine disruptor
<b>Insect/Mite Management</b>		
abamectin	Agri-Mek	acute toxicity, developmental toxin, acute aquatic toxicity
azinphos-methyl	Guthion	acute toxicity, cholinesterase inhibitor, broad spectrum
clethodim	Select, Prism	acute toxicity (DANGER, WARNING label formulations), potential groundwater contaminant
clofentezine	Apollo	possible carcinogen, suspected endocrine disruptor
dicofol	Kelthane	possible carcinogen, suspected endocrine disruptor, acute aquatic toxicity
DPA	DPA	acute toxicity (DANGER label formulations)
endosulfan	Thionex	acute toxicity, suspected endocrine disruptor, broad spectrum
fenbutatin-oxide	Vendex	reproductive/developmental toxin, acute aquatic toxicity, resistance
fenpropathrin	Danitol	acute toxicity, toxicity to beneficials, acute aquatic toxicity
formetanate hydrochloride	Carzol	acute toxicity, toxicity to beneficials, potential groundwater contaminant, resistance
hexythiazox	Savey	possible carcinogen, moderate aquatic toxicity
lamda cyhalothrin	Warrior	acute toxicity, toxicity to beneficials, suspected endocrine disruptor, acute aquatic toxicity
malathion		cholinesterase inhibitor, broad spectrum
novaluron	Rimon	acute toxicity (WARNING label)
oxamyl	Vydate	acute toxicity, broad spectrum
permethrin	Pounce	acute toxicity, toxicity to beneficials, possible carcinogen, suspected endocrine disruptor, acute aquatic toxicity, broad spectrum
pyridaben	Nexter	acute toxicity, acute aquatic toxicity
phosmet	Imidan	acute toxicity, cholinesterase inhibitor, broad spectrum
<b>Weed Management</b>		
2,4, D amine	2,4-D	acute toxicity
dichlobenil	Casoron	possible carcinogen, potential groundwater contaminant, moderate aquatic toxicity
diquat dibromide	Diquat	acute toxicity, potential groundwater contaminant, moderate aquatic toxicity
diuron	Direx, Karmex	known carcinogen, developmental toxin, acute aquatic toxicity
norflurazon	Solicam	possible carcinogen, known groundwater contaminant, moderate aquatic toxicity
oryzalin	Surflan	likely carcinogen, potential groundwater contaminant, acute aquatic toxicity
osoxaben	Gallery	possible carcinogen, potential groundwater contaminant, moderate aquatic toxicity
oxyfluorfen	Goal	possible carcinogen, acute aquatic toxicity
pendimethalin	Prowl	possible carcinogen, suspected endocrine disruptor, moderate aquatic toxicity
pronamide	Kerb	probable carcinogen, potential groundwater contaminant, moderate aquatic toxicity
sethoxydim	Poast	acute toxicity (DANGER, WARNING label formulations), potential groundwater contaminant, moderate aquatic toxicity

#### IV. Acknowledgements & References

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## **V. Revisions to the 2008 Edition**

1. Requirement for pesticide cost added to reporting by August 1 of each year. (p2)
2. Definition added for systematic sampling. More detail provided for sampling/monitoring methods for mites, tarnished plant bug, codling moth, obliquebanded leafroller, plum curculio and apple maggot. (p7-9)
3. Requirements and optional practices have been added for post-harvest disease and disorders. (p9, 15)
4. An optional practice has been added for mite management. P12, 2.o.
5. Two formulations of granulosis virus for codling moth have been added to Use with Justification and Use with Restrictions. P19, 22.
6. Thiamethoxam moved from the Do Not Use category to Use with Restrictions (p22) due to change in EPA designation from possible carcinogen to unlikely to be carcinogenic.
7. Updated acknowledgements with new participants. (p26)
8. Revised grower affidavit and agreement to allow inspection of use of packaging and add detail re grower use of packaging for certified product only. Revised submission checklist to include reminder re product costs required. (p28-29)

**VI. Participating Grower Affidavit and Agreement**

1. Participating grower certifies that the attached self-evaluation and records represents a complete and accurate account of grower practices on acres to be certified at the time the self-assessment is completed and reviewed by the inspector and the IPM Institute for the purposes of certifying participating production.
2. Participating grower agrees to allow access to farm and records for scheduled and unannounced inspections to verify compliance with program requirements including information provided on the self-evaluation and use of Eco Apple brand packaging and promotional materials.
3. Participating grower agrees that Eco Apple certification is approved solely by the IPM Institute of North American and if granted, is for one season only and only for product from participating production units reported in this self-assessment and certified by the IPM Institute.
4. Participating grower agrees not to market any product as Eco Apple brand apples, including use of Eco Apple packaging or other Eco Apple promotional materials or identification, until certification for the product is approved in writing by the IPM Institute. Participant further agrees that if certification is not approved, no product will be marketed as Eco Apple brand apples and no packaging or promotional materials bearing Eco Apple identification will be used. Participant agrees to bear any costs associated with denial of certification including the cost of Eco Apple packaging and promotional materials purchased by the grower.
5. Participating grower acknowledges that participation does not constitute or imply an endorsement by the IPM Institute of North America or Red Tomato of the participating grower or operation.

Participating Grower Name

Signature

Date

**VII. Submission Checklist**

- \_\_\_\_ a. Completed self-evaluation
- \_\_\_\_ b. Pesticide, fertilizer, thinner and growth regulator application records for blocks to be certified including product cost per unit. See page 2 for required information.
- \_\_\_\_ c. Scouting records for blocks to be certified. See page 2 for required information.
- \_\_\_\_ d. Certification fee.

**Fees**

Annual certification/inspection fee: \$ \_\_\_\_\_ Due annually by August 1 with the updated self-evaluation and pesticide application records. The fee\* is based on the number of acres of apples to be certified:

0-99 acres	\$350
100-199	\$450
200-299	\$550
300-399	\$650
≥ 450 acres	\$750

Credit cards or checks accepted.

Credit card number: \_\_\_\_\_ exp. date: \_\_\_\_/\_\_\_\_

Name on card: \_\_\_\_\_

Billing address: \_\_\_\_\_

City/state/zip: \_\_\_\_\_

\*An additional fee may be charged if pesticide application records are not in electronic format. Additional fee to be based on time required to enter application records into TracApple or other acceptable electronic format. Send completed self-evaluation, pesticide application records and required fee to: *IPM Institute of North America, 4510 Regent St., Madison WI 53705. 608 232-1410, Fax 608 232-1440, ipmworks@ipminstitute.org*



\_\_\_\_\_ (date)